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COMMONWEALTH PHYTOPATHOLOGICAL NEWS

A QUARTERLY REVIEW OF NEWS AND VIEWS ISSUED BY THE COMMONWEALTH MYCOLOGICAL INSTITUTE, KEW, SURREY

THE GENUS *PECTOBACTERIUM*

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Although the soft-rot bacteria are relatively unimportant as plant pathogens they have received a considerable amount of attention because of their pronounced pectolytic activity both in vivo and in vitro, and because few taxonomists can agree on the classification of the members of the group.

Dowson, in the second edition of his PLANT DISEASES DUE TO BACTERIA (1957), has accepted the generic name Pectobacterium for coliform bacteria which cause soft-rots of plant tissues and liquefy both gelatin and pectate gels. He has done this because the 1953 International Committee on Bacterial Nomenclature invalidated the generic name Bacterium, and he cannot subscribe to the American practice of including the coliform soft-rot bacteria within the genus Erwinia. I am in full agreement with Dowson on this decision which is also in line with Taylor's (1951) suggestion that these bacteria should be included in an appendix to the scheme of classification recommended by the Coliform sub-committee of the Society of Applied Bacteriology (1949).

Taxonomy

The generic name Pectobacterium was originally given by Waldee (1945) with the description: "non-spore forming Gram-negative, rod-shaped bacteria motile by means of peritrichous flagella or non-motile. Grow readily on media containing inorganic nitrogen compounds and appropriate carbon source. Reduce nitrates to nitrites. In buffered peptone media produce anaerogenic or micro-aerogenic acid fermentation from a wide range of substrates. Secrete an active protopectinase capable of producing visible softening of raw carrot (or other fleshy plant tissue) within 48 hours or less. Active gelatinase produced. Litmus milk acidified without digestion." Burkholder in the latest edition of Bergey's Manual (1957), whilst acknowledging that the soft-rot bacteria constitute a distinct group, would prefer to retain them within the genus Erwinia until more critical comparative studies can be made. Recently, Dorey (1959) has described a pectolytic species of Flavobacterium which occurs in the soil. Flavobacterium species are weak fermenters of carbohydrates but a few strains of this organism produce acid from lactose and salicin in peptone-free media, which is a diagnostic feature of coliform bacteria, and this might lead to confusion with Pectobacterium carotovorum, particularly since Graham (1958) has found chromogenic strains of the latter organism. Despite these difficulties, however, the genus Pectobacterium does embrace bacteria with definite common characteristics and it is at the species level that further

clarification in identification is needed. The species of Pectobacterium have been alternately 'lumped' and 'split' ever since the original descriptions of Bacillus carotovorus (L.R. Jones 1901), Bs. phytophthorus (Appel 1902) and Bs. aroideae (Townsend 1904).

In terms of pathogenicity, it was considered by many workers that only phytophthorus could produce typical blackleg symptoms on potato plants. Whilst working at Cambridge, I found (1950) that a number of so-called carotovorus isolates could cause blackleg when inoculated into young shoots, and Hellmers and Dowson (1953), in an elegant experiment, showed that blackleg symptoms could be readily induced by a wide range of strains provided that the inoculum was introduced into the vascular bundles of the stem. This is not surprising when it is realised that blackening is an autolytic reaction in the host and the activity of the bacteria within the xylem will release both enzyme and substrate into a mobile system.

On biochemical grounds, the three species have been separated by differences in the fermentation of ethyl alcohol, glycerol, and certain carbohydrates, the formation of gas, and the M.R. and V.P. tests. Serological differences associated with definite biochemical characteristics have also been claimed. I could find (1950) no experimental evidence to separate the species with the exception of the one authentic isolate of aroideae which failed to produce gas in the fermentation of sugars even after host passage, and yet remained extremely virulent on a wide range of hosts after ten years in culture. The conclusion must be that no more than variety status can be accorded to the three members of the coliform soft-rot group. The same would hold for the organism producing a crown, stem, and bud rot of Delphinium spp., although the organism causing bacterial blight of chrysanthemum (Burkholder 1953) and slow wilt of carnations (Lelliott 1956) Dowson would describe as a forma specialis. He has used the same designation for the soft-rot bacterium attacking maize (Sabet 1954), but the organism causing crown rot of rhubarb is undoubtedly a separate species rhaponticum since it will not produce a soft-rot in any other host.

There are, then, only two distinct species in the genus Pectobacterium and the biochemical criteria for distinguishing further species are not sufficiently definitive nor is it easy to see how they could be improved. The recent critical work of Kraght and Starr (1953), Wood (1955), and W.K. Smith (1958) on the pectic enzymes has suggested that both pectin methyl esterase and polygalacturonase are produced by the soft-rot bacteria. However, this does not clarify the taxonomy of the group, although Smith could find no qualitative differences in the enzymes produced in 12 isolates which would justify a separation of species. He considers that a pectin methyl esterase in addition to polygalacturonase may be essential for pathogenicity. This theory is supported by the fact that the pectolytic Flavobacterium (Dorey 1959) does not produce a pectin methyl esterase and has not been isolated from a living host plant.

Pathology

The only serious disease caused by a Pectobacterium species is blackleg of potatoes, and I am indebted to Dr. D.C. Graham for comments on the present status of this disease in the U.K. The potato inspection scheme has a blackleg tolerance of 3 per cent. for all grades, but few stocks are rejected each year because of infection and the disease rarely reaches epidemic proportions. Field studies indicate that most first early varieties are very susceptible, particularly Epicure, and also some main crop varieties like Arran Consul. The normal method of transmission is by infected seed, but whether the bacteria are on the surface or in the tuber is not clear. Attempts have been made, both in this country and the U.S.A., to control this carry-over by dipping tubers in a bactericide, but with variable results.

It is a matter of debate whether or not the coliform sof-rot bacteria are free-living in the soil. Kerr (1953) isolated a number of soft-rotting organisms from Scottish soils but it is probable that they were Pseudomonas species, for these were the only types that Graham (1958b) was able to find in soil, and Dowson and I isolated a soft-rotting Pseudomonas species from infected tubers (1950). Graham has succeeded in isolating Pe. carotovorum from the soil in November 5 weeks after lifting a potato crop, but he could not repeat this a month later. He has also

identified the organism in first year seedlings which strongly suggests overwintering in the soil. Other workers, including Chiu (1958) and Dorey (1959) have failed to isolate Pectobacterium from soil.

There is then no unequivocal evidence as to how the blackleg organism overwinters other than in or on tubers and no definite information as to how the tuber is infected other than through wounds or lenticels. Further research could profitably be done to answer these questions and to resolve the whole range of pectolytic bacteria, both aerobes and anaerobes, which attack plant storage organs.

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ROYAL BOTANIC GARDENS

KEW

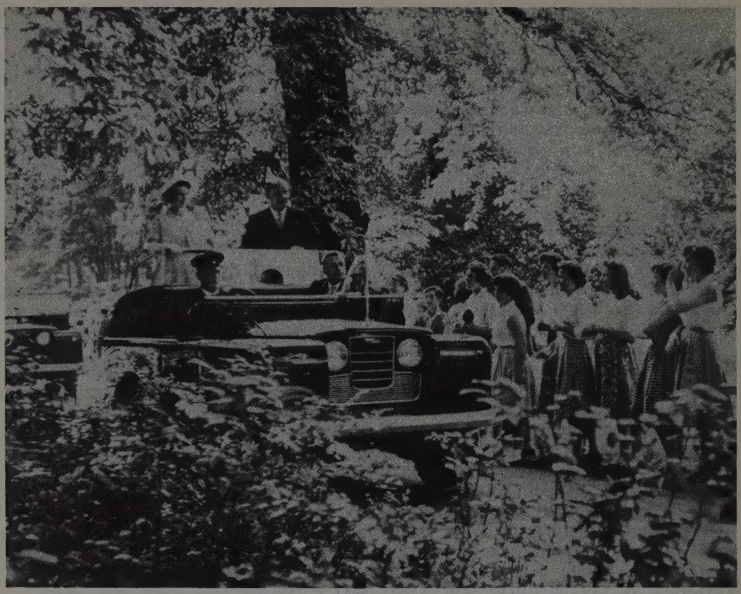
BICENTENARY

The year 1959 marks the bicentenary of The Royal Botanic Gardens, Kew, and the event was celebrated by the holding of a garden party in the Gardens attended by Her Majesty the Queen and His Royal Highness the Duke of Edinburgh. The Princess Royal and the Earl and Countess of Harewood were also present.

The party, held in the afternoon of Tuesday, June 2nd, was attended by a large number of guests including a number of directors of overseas botanic gardens and representatives of numerous universities and botanical establishments both at home and abroad. The weather was exceptionally fine and sunny and the Kew lawns, as yet unspoiled by the subsequent drought, made a perfect setting for what turned out to be a most delightful and memorable occasion.

Her Majesty and the Duke, who were welcomed by Mr. John Hare, the Minister of Agriculture and Dr. George Taylor, the Director, opened the proceedings by planting a couple of commemorative trees on the lawn facing Kew Palace.

After a quick visit to the Palace the Queen toured the Gardens in a Land Rover accompanied by Mr. Hare and the Director. The route was lined with school children and other specially invited visitors, among whom were the full staff of the C. M. I., and after inspecting the spar of Douglas Fir which is to become Kew's new flagstaff and passing through the beautifully reconstructed Palm House her Majesty returned to the Orangery for tea. This lovely Georgian building, after serving for many years as a wood museum, has recently been restored to its original purpose.



Her Majesty with Mr. John Hare and Dr. G. Taylor,
Director, R.B.G., being greeted on her tour of the gardens.
(Photo by Patricia Thomas, Kew.)

Meanwhile, the Duke was being conducted around the Herbarium Exhibition by Mr. Charles E. Hubbard, the Keeper of the Herbarium and Library. Although an exhibition demonstrating the scientific activities of Kew has now become almost an annual event, on the present occasion many of the exhibits were historical in character.

The exhibits, fifty six in all, were arranged throughout the three large wings of the Herbarium and Library. Wing A contained exhibits demonstrating botanical research and advisory work carried out at the present time. Wing B was devoted to Kew's contribution during the past two centuries to botanical progress, in particular in the investigations of the floras of the countries of the British Commonwealth. Wing C contained exhibits primarily intended for the benefit of students and displayed a large selection of living material. In the rooms of the Library were shown a selection of published work by past and present members of the Kew staff as well as examples of old herbals and of certain celebrated botanical publications containing coloured illustrations.

Dr. Dennis exhibited specimens and drawings obtained on his recent expedition to Trinidad and Venezuela, chosen to illustrate some of the characteristic genera of larger fungi in tropical America. Among these were the familiar parasites Crinipellis perniciosus and Mycena citricolor, poroid genera of the Agaricales like Dictyoploca, Favolaschia and Filoboletus, common brightly coloured species of Marasmius and the gill-less Marasmioid genus Hymenogloea, the spores of which had been obtained for the first time, the curious Hydroid genus Mycobonia and the remarkable Pyrenomycete genera Ascopolyporus, Camillea, Phylacia, and Thamnomyces.

On his tour around the Herbarium the Duke had insufficient time to inspect all the exhibits but he showed a lively interest in those he was able to see. He rejoined the Queen at the Orangery in time for tea and after the foreign guests and

The Queen and Prince Philip leaving the Orangery.

some others were presented to Her Majesty the royal pair left the Gardens.

On the day following the garden party many of the visiting botanists and botanical staff were entertained by the Director to an excellent supper held in the Orangery. This proved a most successful social occasion, being obviously much appreciated by the overseas guests who were present.

After visiting the new Palm House.

NORWAY

In the account of the Norwegian Forest Research Institute which appeared in C. P. NEWS, of April 1959 an error occurred through a misunderstanding in the caption to the illustration on p. 30. The building houses all the institutions named on p. 29, which are administratively independent. The Section of Forest Pathology and Entomology is the only part of the Norwegian Forest Research Institute in the "Fellesbygget".

FROM NEAR AND FAR

A Canadian Society of Plant Physiologists was formed in Saskatoon, Sask., last October. Its president is Paul R. Gorham and secretary-treasurer D. Siminovitch, Chemistry Division, Canada Department of Agriculture, Ottawa.

At the end of 1958 the Science Association of Nigeria was inaugurated at University College, Ibadan, with Dr. Eni Njoku of the Department of Botany as president and Dr. Brian Hopkins, lecturer in agricultural botany, as secretary. A four-day conference was held at which it was decided to hold a second conference at Zaria in December 1959.

It is stated in the annual report of the Royal Society and Nuffield Foundation Commonwealth Bursaries Scheme that nearly £14 m. was offered for 26 bursaries in 1958 compared with about £8½ m. for 18 in 1957. In addition to the usual grants Commonwealth countries contributed a little over £3,000.

It was stated in the House of Commons by the financial secretary to the Treasury that from July 1 the Government Chemist's Department would be transferred from direct Treasury control and placed in charge of the C.S.I.R. under the Lord President of Council.

The extent to which the National Research Council of Canada supports Canadian universities in science, engineering, and medicine, is described in the REPORT ON UNIVERSITY SUPPORT 1958-59 (pp. ii + 143. Ottawa. National Research Council, 1958. 50 cents). A total $475,000 for 1958-9 has been estimated for expenditure on scholarships in science and engineering and $15,000 for psychology [apparently not a science], $472,000 on fellowships and $120,000 on medical associateships. For research, grants in aid amount to $2,350,000 for science and engineering and $1,250,000 for medical. $43,000 are also allocated to facilitate travel by university staff.

Shell Chemical Company Ltd. announce that supplies of a new zineb fungicide, shell zineb, have been available from April onwards.

This fungicide is primarily for the control of blight on potatoes, but it is also recommended for horticultural use and the control of diseases of market garden crops. For the early control of potato blight, shell zineb localises centres of infection and, if properly applied, should prevent the rapid spread of the blight.

For aerial application on potatoes the recommended rate is 2 lb. in 1 to 2 gallons of water per acre. In a land spraying machine 2 lb. should be applied in 25-100 gallons per acre.

Shell zineb is in the form of a fine wettable powder and is available through the company's appointed distributors in 2 lb. and 10 lb. bags and 110 lb. drums.

A new journal dealing with the technology of biochemical and microbiological sciences appeared in February 1959 (JOURNAL OF BIOCHEMICAL AND MICROBIOLOGICAL TECHNOLOGY AND ENGINEERING, 1, No. 1, pp. 127. Quarterly; annual subscription (U.K.) £5.15s. (outside U.K.) $15.50. New York and London: Interscience Publishers Inc.). Dealing largely with industrial processes, it should, however, be available to mycologists and plant pathologists for reference.

F. Stell, who was mycologist in the Department of Agriculture, Trinidad, from 1921 to 1939 has bequeathed in his will a substantial sum for the founding of scholarships at the Yorkshire (West Riding) Institute of Agriculture, Askham Bryan, and at Leeds University, to be known as the Frank Stell Scholarships.

Saying of the year - "I would like to see the system of the Commonwealth Agricultural Bureaux extended to other sciences and set up in whichever country has the greatest interest in the particular subject." — H.R.H. the Duke of Edinburgh in his address at the annual meeting of the Pakistan Association for the Advancement of Science.

BRITISH MYCOLOGICAL SOCIETY

SPRING FORAY

Visit to Fernhurst Research Station

The 1959 Spring Foray meeting of the Society was held at Midhurst, Sussex, and as part of the meeting a visit was paid to Fernhurst Research Station at the kind invitation of Messrs. Plant Protection Ltd.

After being welcomed by Mr. Ward, the Managing Director, the party commenced a tour of the Research Station with a visit to the Trials Fields. Some 6 acres of apples carry mainly insecticide and fungicide trials and the 40 acres of fields include a small amount of hops and soft fruit and a large number of experiments on arable crops. Dr. M. J. Geoghegan described apple scab tests, Mr. L. S. Lloyd those on potato blight and Mr. H. M. Fox seed dressing trials.

After an excellent lunch, provided by our hosts, two seed-dressing machines devised at Fernhurst by the Machinery Group were demonstrated by Mr. I. J. Balls and Mr. I. W. Callan, emphasisingthe importance of combining application method with product development. Dr. F. C. H. Gayner and Mr. J. A. Berendt described the work in the orchard. The dessert apples are now 11 years old and bearing well and form an excellent background for assessment of the true practical value of current spraying practices. Spersul (sulphur), fernide (thiram), karathane/captan and spersul/captan are the main fungicide spray programmes on the dessert fruit, while mercury in an eradicant schedule is used on the Bramley's seedlings.

The market garden area (Messrs. J. Swabey, C. G. Smith and T. Harris) contains some 2 acres of glasshouses, 2 acres of Dutch lights, and 50 acres of outdoor crops. Baby Lea tomatoes are grown for early yields and gave 1 ton per acre up to May 4 this year. The main soil sterilising here is by steam, and Shirlan (salicylanilide) is used for leaf mould (Cladosporium). Perpetual flowering carnations produce about $\frac{1}{4}$ million blooms per house (152 ft. x 45 ft.) per year and here and in the chrysanthemums the fungicide treatment is fernide (thiram). The market garden produces about £15,000 worth of crops per year off 50 acres with farmyard manure, a high fertiliser usage, and thorough plant protection programmes all contributing to high productivity; feeding during the season in the glass is entirely liquid (solufeed).

The orchard and market gardens (and the farm, which was not visited) are all run as commercial units for profit and it is an essential part of their planning that all plant protection treatments should fit into a profitable commercial enterprise.

The meeting terminated with tea and Dr. J. C. F. Hopkins thanked our hosts and the research staffor a most enjoyable and instructive day.

The party leaving the Trial Fields

Dr. Geoghegan explains the lay-out

PERSONAL NEWS

C.M.I. News

The Director and Dr. Ainsworth attended a meeting of medical and veterinary mycologists at Bristol in April.

Dr. Hayward is spending three months at Cambridge working with Dr. Dowson on bacteriological problems.

Plant pathology students from Imperial College under Dr. Batts and a party of senior biologists from St. Maur's School, Weybridge, visited the Institute in June and April respectively.

At the kind invitation of the Director of R.B.G. all members of the staff of C.M.I. and their wives had the opportunity to be in the Gardens during the visit of H.M. the Queen and Prince Philip on the occasion of the Bicentenary.

Visitors

Among overseas visitors have been Andrew Angus, N. Rhodesia; R. Antoinem Mauritius; Dr. Shirley Brown, Sydney, Australia; A.R. Crist, Dr. Gerard and Mrs. Gorter, Pretoria, S. Africa; Dr. Feder, Florida, United States; Drs. Abdur Rashid Khan, Dacca, S.B. Saksena, Sangor, and R.B. Valdez, Lajuna, India; Dr. E.W. Russell, Kenya; Dr. H.P.R. Seeliger, Bonn, Germany; and John Simons, Nigeria.

Appointments, Promotions, Retirements, etc.

The Overseas Service Division of the Colonial Office announce the following: M.D. Ffrench-Mullen, deputy director of agriculture, Mauritius; L.J.S. Littlejohn, director of agriculture, Cyprus; D. Watt-Smyth, director of agriculture, Aden.

Royal Society

The following have been elected Fellows: Prof. G.E. Blackman, Prof. A.R. Clapham, and Prof. O.W. Richards.

Association of Applied Biologists

The following are the Officers for the year 1959-60:

Pres: Dr. R.V. Harris
Vice-Pres: Dr. Mary Glynne
Pres.-elect: Dr. C. Potter
Treas: Dr. H.F. Barnes

Gen.Sec: Dr. L. Broadbent
Programme Sec: Dr. W.G. Keyworth
Editor: R.W. Marsh
Asst.Editor: Dr. I. Thomas

Senior biologists from St. Maur's school, Weybridge, who visited the C.M.I. recently

(continued on p. 46)

OVERSEAS NEWS

CANADA

IMPROVED TECHNIQUES FOR THE STUDY OF PLANT PATHOGENS

The studies reported below by Dr. E.W.B. Ward, Canada Agriculture Plant Pathology Laboratory, Edmonton, Alberta, may be of interest to workers engaged in research on the physiology of parasitic fungi.

It has become a common practice to use homogenates of fungus mycelium for inoculum in shake-culture studies. Such homogenates are usually prepared in buffer or saline on the assumption that cell damage will be reduced during the homogenizing process by the use of such solutions. From the results of recent experiments with a low-temperature basidiomycete at Edmonton the correctness of this assumption appears questionable. This fungus, which has been known for many years but whose generic position is still undetermined, is the principal cause of winter crown rot of alfalfa and snow mold of grasses in northern Alberta. It has been the subject of various physiological experiments in which 0·25 M sodium chloride has been used as the suspending agent in the preparation of mycelium homogenates. Recently a comparison was made of the growth in shake culture resulting from inoculum prepared in water and in various concentrations of sodium chloride. Growth was found to be inversely proportional to the concentration of sodium chloride and was greatest from inoculum prepared in water. A later test showed that the inhibitory effect of sodium chloride was not due to an unfavorable osmotic relation nor the chloride ion. In this experiment water as a suspending agent was compared with 0·25 M glucose, sodium chloride and potassium chloride, and 0·125 M sodium carbonate and potassium carbonate solutions. Growth from the homogenates suspended in water or glucose solution was similar and amounted to 5-6 times that from any of the salt preparations. Of the salts, the carbonates were more inhibitory than the chlorides.

I. L. Conners

AUSTRALIA

Plant Pathologists Honoured

The Australian Medal for Agricultural Science for 1959 has been awarded to Mr. C.G. Hughes and Dr. D.R. Steindl, senior pathologists of the Queensland Bureau of Sugar Experiment Stations, in recognition of the contribution they made in detecting, determining the etiology of and in developing successful control measures for the important ratoon stunting disease of sugarcane. This unique and insidious virus disease has been a source of heavy annual loss in cane tonnages throughout the world and great credit is due to Hughes and Steindl for their speedy handling of the whole investigation.

Oil Misting of Bananas

Following trials conducted during 1958 in Northern New South Wales on low volume misting of bananas with mineral oil for the control of Cercospora leaf spot many plantations received treatment last summer. Fortunately, in New South Wales it is only during the months of January, February and March that rainfall and temperature conditions favour leafspot infection and it was only during these months that high volume spraying with copper fungicides was formerly carried out. Imported shoulder-mounted misting machines of several makes were used and oil applications were made at fortnightly intervals. A high degree of control of leafspot is at present indicated in most plantations but full assessment cannot be made until July and August of this year.

Unusual Seed Transmission of Rhizoctonia and Sclerotinia

Mr. J. Walker, plant pathologist, reports that during routine germination tests, carried out by our Seed Testing Laboratory, two pathogens not commonly seed-borne were found. Germinating bean seeds from two crops of the variety Brown Beauty grown on the South Coast of New South Wales showed reddish-brown, sunken lesions on the hypocotyl from which Rhizoctonia solani was isolated. One lot of seed was carrying this fungus to the extent of about 2 per cent. Two other samples of seed each yielded one seedling killed by Sclerotinia sclerotiorum. All seed samples contained many weather damaged seeds and wet conditions during seed harvesting are considered to have led to seed infection by these fungi.

Mildew of Rockmelon

Until recently the rockmelon variety P.M.R. 45 has been resistant to powdery mildew in the field in New South Wales. During last season the resistance of this variety has broken down in the Murrumbidgee Irrigation Areas and in the Murray River area of this State. In the latter locality, however, plants of the varieties P.M.R. 5 and P.M.R. 6 remained resistant to powdery mildew.

It has been accepted in the past that the powdery mildew of rockmelons and other cucurbits in New South Wales has been caused by the imperfect stage of Erysiphe cichoracearum DC. However, Clare (AUST. J. SCI. 20: 273, 1958) considers that the powdery mildew of cultivated cucurbits in south-eastern Queensland is caused by the imperfect stage of Sphaerotheca fuliginea (Schlecht.) Poll. Clare's opinion is based on the lack of appressoria, the presence of well developed fibrosin bodies in the conidia and conidiophores, and the conidial measurements of the Queensland fungus.

It is possible S. fuliginea is now present also in New South Wales and caused the breakdown of P.M.R. 45, or that a situation exists similar to that described in U.S.A. where the breakdown of P.M.R. 45 is attributed to the appearance of race 2 of E. cichoracearum. Mr. R.J. Conroy, plant pathologist, will examine these possibilities.

An Interesting Fungus

Interest is revived in Xeromyces bisporus L. Fraser (PROC. LINN. SOC. N.S.W. 78: 241-246, 1953) first described as the cause of deterioration of stick licorice in Army stores in Australia during World War II. It has now been found in England by H.J. Bunker, causing quite serious losses of concentrated jellies. This fungus is capable of growth on media of very high sugar content.

C.J. Magee

NEW ZEALAND

Personal News

Dr. E.E. Chamberlain (director, Plant Diseases Division) is at present on an overseas tour visiting plant pathology research stations in North America, the United Kingdom, and Europe.

Dr. Grogan of the University of California Plant Pathology Department has been working with Dr. R.E.F. Matthews of Plant Diseases Division, Auckland, on the preparation of an antiserum for cucumber mosaic virus.

Mr. L.G. Copp, the chief wheat breeder at the Crop Research Division, Lincoln, will shortly be leaving for a visit to cereal breeding research centres in California, Canada, the U.K., Europe, and Australia. Mr. Copp has successfully developed mildew resistant varieties of all the best N.Z. wheats and is now successfully adding stem-rust resistance, using a back-crossing technique in a controlled environment cabinet built to Canadian design. He will be in particular studying methods of breeding for disease resistance in cereals.

The fourth annual meeting of the N. Z. Microbiological Society was held in May at Auckland University. The main topic was a symposium on bacterial diseases of plants and animals, all other contributed papers being on virus diseases. Dr. R. E. F. Matthews presented a paper on virus nucleoprotein particles with differing biological and physical properties.

Mr. P. R. Fry gave an account of his work on the early stages of multiplication of tobacco mosaic virus and Mr. Franchi spoke on the biological effects of 2 thiouracil on tobacco mosaic virus.

A very lively and entertaining evening social was held at Mt. Albert as guests of the Plant Diseases Division.

Wheat

Suspected Downy Mildew infection caused by Sclerospora macrospora

Downy Mildew of Cereals

Downy mildew of cereals and grasses has recently been found affecting oats and "couch" grass (Agropyron repens) near Lincoln this winter. The disease was occurring on the couch grass in an old pasture and on the oats which had been surface drilled about three months previously into an old pasture to provide green feed. The infection was confined to the leaf tissues of the infected plants, causing narrow or wide longitudinal brown streaks extending the length of the leaf blade. Many plants were completely killed by the disease, but the losses were not greater than 10 to 20 per cent. Photographs taken in previous seasons of wheat heads with proliferation of leaf tissue from sterile florets appeared identical with illustrations of downy mildew of wheat in U. S. A., so it is very likely that all cereals and many grasses are affected in New Zealand.

As in overseas countries, however, there is no evidence that the disease will assume epidemic proportions and it is likely to be only of occasional and localised importance. The disease occurred in the oats and couch grass after a prolonged wet spell during which time surface flooding of pastures and paddocks was fairly common. The brown, infected leaf tissue was densely filled with brown spherical oogonia ranging in diameter from 28-40 μ (ave.30 μ). Only a small proportion of these had thick walled oogonia nearly filling the oogonium. These were typical of Sclerospora macrospora but the size was smaller than usually reported for this species overseas i. e. 50-75 μ.

No infection of oats, wheat, or barley occurred when a suspension of oogonia from leaf tissue was sprayed over young plants held at 100 per cent. humidity for 12 hours. The natural infection probably occurs from soil-borne oospores germinating to form zoospores following heavy rain and temporary flooding.

Harvey C. Smith

MALAYA

PUCCINIA POLYSORA IN MALAYA

In 1955, Puccinia polysora was identified by the Commonwealth Mycological Institute on specimens of maize collected in the Federation of Malaya. Some of the specimens had been collected as early as 1950, so that the fungus is now known to have been present in Malaya at least since that date. It is thought that it did not reach Malaya much earlier as from about 1947 quite intensive collecting of plant parasitic fungi had been going on. Despite this only one specimen of maize rust had been collected before 1950 and this was of P. sorghi. This specimen, incidentally, was collected in the cooler highland area at about 5,000 feet altitude, P. sorghi never having been found in the lowlands where P. polysora is now common. Once P. polysora had arrived it was conspicuous and could not have remained unseen for long. Hence it is believed that it had not arrived much before the first collection was made in 1950.

In 1956, Dr. H.H. Storey sent three of his pure lines of maize, bred at the East African Agriculture and Forestry Research Organization, Kenya, as part of a programme of polysora rust control, for trial in Malaya. These lines were:

(a) ex A.F.R.O. 29. Homozygous for gene Rpp1. Resistant to race EA1 (minute necrotic or chlorotic specks, without sori). Susceptible to race EA2.
(b) ex A.F.R.O. 24. Homozygous for gene Rpp2. Moderately resistant to races EA1 and EA2 (necrotic lesions without sori or with minute sori).
(c) ex A.F.R.O. 27. Homozygous for a gene, probably Rpp2. Moderately resistant to races EA1 and EA2 (necrotic lesions usually with minute sori).

These were grown in Malaya in proximity to a local maize variety highly susceptible to the rust, but despite an abundance of inoculum no rust sori developed in either ex A.F.R.O. 29 or 24. In both cases small chlorotic spots, thought to be aborted infections, were present, few on ex A.F.R.O. 29 and numerous on ex A.F.R.O. 24. A very small number of sori of P. polysora developed on the line ex A.F.R.O. 27, and numerous small chlorotic spots were also present.

It has been pointed out by Dr. Storey that these results suggest that the form of P. polysora in Malaya reacts in the same way as the form EA1 found in East Africa, although, as shown by Cammack (TRANS. BRIT. MYCOL. SOC. 41: 89, 1958), uredospores in South-East Asia belong to a spore form smaller than and distinct from that occurring in Africa.

A. Johnston

(continued from p. 48)

can often be seen over the pens.

During the winter especially, wild birds outnumber the collection birds and seem very tame, coming for food and sanctuary. The marshes near the Severn, which can be seen from a tower in the pens, are the winter home of 3,000-5,000 white-fronted geese, Anser albifrons. They arrive towards the end of September, reaching peak numbers in January-February, and leave again in mid-March, returning to their breeding grounds in North Russia.

The party left in the late afternoon after having spent a very instructive and enjoyable day at the Wildfowl Trust. It was noted that the Trust is open to the public every day except Christmas Day and Sunday mornings (members only) and is a worthwhile place to visit by anyone travelling in the West Country of England.

J.V.B.

AFRICA

Kenya

LONG SERVICE

Mr. Johnstone Maina has been an assistant in plant breeding in the Department of Agriculture, Kenya, for 32 years, having started with Gerald Burton in the early days at the Scott Laboratories, Nairobi. The original wheat breeding station was established in 1928 at Njoro [see C.P. NEWS, vol. 5, pt. 1, January 1959] on the recommendation of the late Sir Rowland Biffen after his visit to Kenya. Johnstone is still working at Njoro where the rust research programme has recently been revised to include a more detailed study of the fungi themselves and their epidemiology. Here we see Johnstone crossing wheat varieties in the breeding cage.

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POOLE DORSET

(continued from p. 40))

C.E. Hubbard has been appointed deputy director of the Royal Botanic Gardens, Kew, in succession to Dr. N.L. Bor who retired in March. E.W.B.H. Milne-Redhead is appointed deputy keeper of the herbarium and library.

Dr. P.E. Weatherley has been appointed as Regius professor of Botany at Aberdeen University as from 1 October 1959 in succession to Prof. J.B. Matthews, who is retiring.

Sir Robert Rae, director of the National Agricultural Advisory Service, retires at the end of July 1959 and will be succeeded by J.A. McMillan, senior education and advisory officer.

N.W. Pirie has been elected chairman of the Biological Council.

Dr. J.T. Martin has been appointed to a readership in Chemistry of Insecticides and Fungicides at the University of Bristol.

Prof. A.S. Boughey, University College of Rhodesia and Nyasaland, has been awarded a travelling grant to visit research centres in N. America.

Dr. J. Ramsbottom has been elected president of the Society for the Bibliography of Natural History for 1959.

Dr. J. Unrau, head of the Department of Plant Science, University of Alberta, has been appointed to the National Research Council of Canada.

D. Goodchild has been appointed to the virus unit of the Division of Plant Pathology, C.S.I.R.O., Australia.

E.C. Hislop has been appointed plant pathologist at W.A.C.R.I., Ghana, to do research on fungicides. His preliminary investigations concern uniform surface coverage, weathering, and multiple inoculation techniques.

OBITUARY

All plant pathologists will hear with deep regret of the deaths of two workers famous in the realms of plant protection. Sir Guy Marshall, founder of the Commonwealth Institute of Entomology and director from 1913-42, set the pattern for the later development of the Commonwealth Agricultural Bureaux organization and had much to do with introducing plant protection services to the farmer on a commercial basis.

Dr. F. Tattersfield, formerly head of the Insecticides and Fungicides department at Rothamsted, was largely instrumental in putting insecticide work on an accurate quantitative basis, which has led to the rapid developments of modern times. His name will always be associated with the valuable pyrethrum industry of Kenya which he did so much to establish.

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THE WILDFOWL TRUST

PROBLEM OF ASPERGILLOSIS

An informal meeting of workers in medical and veterinary mycology was held recently at Bristol University and at the Wildfowl Trust at Slimbridge on the Severn between Bristol and Gloucester. The second day was spent at the Trust, nearly 50 workers attending the paper reading session and visiting the laboratories and the unique collection of waterfowl assembled by the director, Peter Scott.

Ross's Goose (Anser rossii) being admired by some of the party. Peter Scott's house and studio in the background.

Work of the Trust

Dr. G. V. T. Matthews, the assistant director (research), gave a short account of the work of the Trust. Research is restricted to the Anatidae and is primarily directed towards the conservation of our wildfowl stocks. Part of the work, in the first instance, consists of trapping large numbers of birds in cage traps, decoys, and by means of rocket-nets, which were shown to the party. Each bird is identified by a numbered and addressed durable ring, and subsequent recovery of rings shows from where our birds originate and how they move between their wintering and breeding grounds. The European wigeon, Anas penelope, for instance, may breed east of the Urals and winter in western Europe and Great Britain. The British population of the pinkfooted goose, Anser brachyrhynchus, breeds in Iceland and Greenland, while a third population breeds in Spitzbergen and winters in Western Europe, but not in Great Britain. Such extensive distributions and movements emphasise the international aspect of this work and, for a species to survive, many countries must co-operate in establishing effective conservation.

Besides studying movements of birds information on the numbers and dynamics of a population can be obtained by capture-recapture techniques using rocket-nets. The British population of the pinkfooted goose is about 40, 000 and 95 per cent. of the population is replaced every 7 years.

Studies based on the counting of a sample of about 1000 waters in Great Britain once every month during the winter are being made to discover trends in the number of wildfowl. These are being augmented by an aerial survey, particularly of areas that are difficult to cover on the ground, such as the Hebrides, one of the wintering grounds of the barnacle goose, Branta leucopsis.

Much of this work is providing valuable information on wildfowl habitats and on the food preferences of ducks and geese, and ground surveys of the vegetation

of feeding grounds will form the basis of good refuge management.

This research is supported by the Nature Conservancy and is being used to formulate an enlightened conservation policy to ensure that the nation does not lose a very interesting part of the country's fauna.

Disease Problems

During the afternoon the party was shown the laboratories and the collection. A study is being made by J. V. Beer of aspergillosis (Aspergillus fumigatus), in wildfowl. Post-mortem examinations carried out in collaboration with Cambridge University have indicated the importance of disease as a controlling factor in birds and has provided valuable data on the epidemiology and etiology of aspergillosis and other diseases. It seems likely that all waterfowl species are susceptible to aspergillosis, but to varying extents. Tribes such as the shelducks and sheldgeese are highly susceptible while the whistling ducks rarely succumb. There is an age difference: adults die at the rate of about 0·5 per cent. and young birds at between 2 and 15 per cent. Studies have been made on the physiology of the fungus in relation to the in-vivo environment, on methods of control and cure, and on epidemiologic factors. Some of the studies have led to modifications of the rearing equipment and have reduced the level of the disease. Diagnosis is a very real problem as generally a bird is moribund before symptoms can be noted. This is being tackled in collaboration with workers at Brompton Hospital.

The Bird Collection

The collection was seen next and consists of 147 species and subspecies and about 1,300 individuals. In 1946, Peter Scott moved a small nucleus remaining from his pre-war collection to Slimbridge and has gradually built the collection up into its present form. One rare bird on the verge of extinction, the ne-ne or hawaiian goose, Branta sandvicensis, is being bred in numbers for re-establishment in suitable habitats. In 1952, the world population was 30 but now stands at

Rushy Pen Pond with various wildfowl

about 150. This year, 26 ne-ne may be reared. Eggs laid by other species are collected, and hatched and reared by hens. In this way about 700 young birds become available for improvement of the Slimbridge collection and the Peakirk collection near Peterborough. Some are sold to owners of both small and large collections.

Many of the species are kept fully winged and flocks of flying geese and ducks

(continued on p.44)

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